

## NOMENCLATURAL AND TAXONOMIC NOTES ON COSTA RICAN ARACEAE

Michael H. Grayum

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166 U.S.A.

### ABSTRACT

Twelve new species and two new subspecies of Araceae are described from Costa Rica: *Anthurium clidemioides* Standl. subsp. *pacificum* Croat & Grayum, *A. limonense* Grayum, *A. obtusum* (Engl.) Grayum subsp. *puntarenense* Grayum, *Homalomena hammelii* Croat & Grayum, *Monstera buseyi* Croat & Grayum, *M. filamentosa* Croat & Grayum, *M. glaucescens* Croat & Grayum, *M. lentii* Croat & Grayum, *M. molinae* Grayum, *Stenospermation majus* Grayum, *Stenospermation pteropus* Grayum, *Syngonium castroi* Grayum, *Syngonium rayi* Croat & Grayum, and *Xanthosoma dealbatum* Grayum. *Anthurium trinerve* Miq. var. *obtusum* Engl. and *Spathiphyllum wendlandii* Schott subsp. *montanum* R.A. Baker are elevated to species rank as *A. obtusum* (Engl.) Grayum and *S. montanum* (R.A. Baker) Grayum, respectively. *Monstera dilacerata* (K. Koch & Sello) K. Koch, a well-known name (though never consistently applied to any particular species), is here relegated to synonymy under *Epipremnum pinnatum* (L.) Engl. *Monstera pinnatipartita* Schott, the oldest name attributable to any species previously known as *M. dilacerata*, is neotypified accordingly.

KEY WORDS: Araceae, *Anthurium*, *Homalomena*, *Monstera*, *Spathiphyllum*, *Stenospermation*, *Syngonium*, *Xanthosoma*, Costa Rica, systematics

Field study of Araceae in Costa Rica over the past two decades has revealed numerous new taxa. Although many of these have been described in previous revisionary or floristic papers, a miscellaneous assemblage remains unnamed. The imminent publication of certain regional floristic works requires that these novelties be dealt with at the present time, together with several pertinent nomenclatural and typological problems.

## ANTHURIUM

*ANTHURIUM CLIDEMIOIDES* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 22:3. 1940.

This is one of just two species in *Anthurium* sect. *Polyphyllum*, unique in several attributes, including internodal roots and inaperturate, gemmate pollen (see Grayum 1990: 670). Because of its creeping habit and distant, appressed,  $\pm$  cordate, palmately veined leaf-blades, *Anthurium clidemioides* is highly distinctive within the genus, superficially resembling a *Dioscorea* or (as the epithet implies) some epiphytic Melastomataceae. It is virtually endemic to Costa Rica, known from adjacent Panamá by a single collection (Croat & Grayum 60202 [MO]) from Prov. Bocas del Toro.

*Anthurium clidemioides* occurs in both the Atlantic and Pacific lowlands of Costa Rica. Material from the Pacific slope differs consistently in having generally larger, proportionately narrower, less bullate and less deeply cordate leaf-blades, as well as purple (rather than green) spadices. As the type is an Atlantic slope collection, the Pacific slope entity is here described as a new subspecies.

*ANTHURIUM CLIDEMIOIDES* Standl. subsp. *PACIFICUM* Croat & Grayum, *subsp. nov.* TYPE: COSTA RICA. Puntarenas: Cantón de Golfito, Jiménez, Alto de Carbonera, camino a Cerro Osa, 8° 25' 30" N, 83° 19' 00" W, 200–350 m, 18 Sep 1990, A. Chacón 1062 (HOLOTYPE: MO!; Isotypes: CR!, INB!).

Subspecies haec ab subspecie nominata differt laminis foliorum majoribus proportione angustioribus minus bullatis vadius cordatis spadicebus purpuratis.

Appressed-climbing trunk epiphytes to at least 10 m above the ground; stems elongate, ca. 2–3 mm wide; cataphylls not produced. Petioles ca. 1.5–9.0 cm,  $\pm$  flattened or sulcate adaxially, rounded abaxially, the margins acute. Leaf-blades ca. 6.6–27.1  $\times$  3.5–12.6 cm, ovate or deltate to lance-ovate or -deltate, truncate to cordate at base, glossy or weakly velvety adaxially, weakly bullate, eglandular. Peduncles obsolete to 1.3 cm. Spathe ca. 2.1–6.8  $\times$  0.5–0.9 cm, oblong- to linear-lanceolate, green. Spadix ca. 2.9–9.3 cm, subsessile, purplish at anthesis. Ripe frts. orange or red.

Pacific lowlands of Costa Rica from the Reserva Biológica Carara south to the Península de Osa; 0–650+ m; January, March, June–October, December.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Puntarenas: Reserva Forestal Golfo Dulce, Aguabuena, Rincón de Osa, 8° 42' 20" N, 83° 31' 30" W, 50–150 m. Aguilar 227 (INB); between Rincón de Osa and Rancho Quemado, ca. 10 km W of main Rincón–Pt. Jiménez Road, 8° 41' N, 83° 32' 30" W, 150–260 m. Croat & Grayum 59773 (CR, MO [2 sheets]); Cantón de Golfito, Península de Osa, Estero Guerra de Sierpe, 8° 46' 00" N, 83° 35' 10" W, 200 m. Estrada 428 (INB); Cantón de Osa, Rincón. El Campo, Aguabuena, cuenca superior de Quebrada

Aguabuena, 8° 42' 50" N, 83° 31' 42" W, 350 m, *G. Herrera 4289* (INB,MO [2 sheets]); Cantón de Golfito, Jiménez, Alto de Carbonera, Cerro Osa, 8° 25' 30" N, 83° 19' 00" W, 326 m, *G. Herrera 4315* (CR,MO); Parque Nacional Corcovado, Sirena, Ollas Trail, 8° 27–30' N, 83° 33–38' W, 0–150 m, *Kernan 30* (CR,MO); Osa Peninsula, Corcovado National Park, 0 km to 2 km west of the park headquarters at Sirena, 0–200 m, 8° 29' N, 83° 36' W, *Liesner 2922* (MO [3 sheets]); Cantón de Osa, Rancho Quemado, Finca de Juan Marín, cerca a Guerra, 8° 44' 00" N, 83° 35' 05" W, 250 m, *Marín 95* (INB,MO); Corcovado Nat. Park, near Estación Sirena, 8° 29' N, 83° 35' W, 10 m, *Merz 559* (CR). San José: hills at SW part of Montañas Jamaica, ca. 2.5 km NE of Bijagual de Turrubares, Carara Reserve, 9° 45' N, 84° 33.5' W, 460–575 m, *Grayum, et al. 5493* (MO); Cantón de Puriscal, San Martín, falda W del Cerro Pelón, 9° 43' 40" N, 84° 23' 58" W, 650–800 m, *J.F. Morales & González 4538* (INB); Reserva Biológica Carara, Sitio Sendero Lalo Barboza, 9° 45' 40" N, 84° 31' 50" W, 300 m, *Zúñiga & Varela 290* (INB,MO).

*Herrera 7807* (CR), from the Atlantic slope of Costa Rica, has leaves resembling those of *Anthurium clidemioides* subsp. *pacificum*, but green spadices as typical of subsp. *clidemioides*. The sole Panamanian collection of *A. clidemioides*, though from the Atlantic slope, resembles subsp. *pacificum* in terms of leaf dimensions and shape. Unfortunately, the specimen is sterile, so spadix color cannot be assessed.

**ANTHURIUM LIMONENSE** Grayum, *spec. nov.* TYPE: COSTA RICA.

Limón: Hacienda Tapezco–Hda. La Suerte, 29 air km W of Tortuguero, 10° 30' N, 83° 47' W, 40 m, 30 Aug 1979, *C. Davidson & J. Donahue 8955* (HOLOTYPE: MO-2714678!).

Inter species sectionis *Polyneurii* aspectu cum *Anthurio ravenii* Croat & R.A. Baker optime congruens, sed differt pedunculis multo brevioribus spadicebrevioribus purpuratisque.

Epiphytes, apparently ± appressed-climbing; stems to at least 2.5 cm wide, with elongate roots; cataphylls thin, eventually weathering to few, fine, reddish brown fibers. Petioles ca. (17–)29–34 cm, terete. Leaf-blades ca. (22.5–)33–48 × (11.5–)16–21 cm, simple, lance-ovate or -deltate, deeply cordate at base, eglandular. Peduncles 6.4–7.5 cm (< 25% petiole length), erect. Spathe 5.0–9.5 × 1.2–2.5 cm, lance-oblong to ± oblanceolate, greenish white to yellow-green. Spadix (3.5–)5.7–8.5 cm, stipitate by 2–6 mm, pinkish purple to violet. Ripe frts. unknown.

Endemic to Costa Rica, where known only from the Llanuras de San Carlos and Tortuguero on the Atlantic slope; 0–50 m; March–April, August.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: 22 km NE of Quesada by air, 4 km W of Muelle San Carlos, 10° 28' N, 84° 30' W, *Liesner*

14098 (CR). Limón: Palacios, ca. 15 km WNW of Tortuguero village, on farm of Fidel Varela, 10° 28' N, 83° 38' W, ca. 5 m, *Thomsen & Korning 1309 (C)*.

Its very short (absolutely and relative to the petioles) peduncles immediately set *Anthurium limonense* apart from all other Costa Rican *Anthurium* species with large, cordate, eglandular leaf-blades, with the exception of the very different *A. schottianum* Croat & R.A. Baker (a member of sect. *Pachyneurium* Schott, comprising very much larger, terrestrial plants with much larger inflorescences). A few other such species (*A. obtusilobum* Schott, *A. ranchoanum* Engl.) may occasionally have peduncles as short, but always > 25% of the petiole length.

*Anthurium limonense* is generally most similar to a group of species mostly assigned to sect. *Polyneurium* Schott. Among Costa Rican species, the widespread and sympatric *A. ravenii* Croat & R.A. Baker [mistakenly referred to sect. *Calomystrium* Schott by Croat (1983, 1986)] bears the closest overall resemblance to *A. limonense*. However, in addition to its longer peduncles, *A. ravenii* differs in having generally longer petioles and larger leaf-blades, as well as longer spadices that are always whitish to yellowish or greenish at anthesis, rather than purplish. The label description ("violet") of the spadix coloration on the holotype of *A. limonense* is confirmed by a color slide of the living plant in the field, included in a fragment folder.<sup>1</sup> *Anthurium cuspidatum* Mast. (another widespread member of sect. *Polyneurium* that occurs sympatrically with *A. limonense*) also has reddish or purplish spadices, but differs in its non-cordate to shallowly cordate leaf-blades with more numerous primary lateral veins, and longer peduncles.

Another Costa Rican *Anthurium* species that may closely resemble *A. limonense* superficially is *A. obtusilobum* (sect. *Calomystrium*), which may have comparably short peduncles (in the absolute sense) in conjunction with pinkish or purplish spadices (post-anthesis). However, *A. obtusilobum* has proportionately broader leaf-blades, usually with a wider posterior sinus, that are conspicuously lineate adaxially with raphide cells (characteristic of sect. *Calomystrium*, but not evident in *A. limonense* or the other species mentioned in the foregoing paragraph). It is also restricted to somewhat higher elevations, mostly above 300 m.

I have also compared *Anthurium limonense* with a wide range of material (including many types) from outside Costa Rica, throughout the Neotropics. The only other even grossly similar species encountered during this survey were the terrestrial or epilithic, Honduran *A. lancetilense* Croat, and the montane, South American *A. sanguineum* Engl., both of sect. *Belolonchium* Schott. These species were easily eliminated on the basis of inflorescence details and other features.

The Atlantic coastal plains of Costa Rica are not noted for high endemism; indeed, most elements of this flora are widespread. Nonetheless, several species are documented as endemic to this zone, such as the highly distinctive and endangered palm *Cryosophila cookii* Bartlett (Evans 1996). Perhaps the conservation status of

<sup>1</sup> The label of the paratype reads "Spadix light yellow-green. Inflorescence purple/pink"; I am certain this represents a confusion of terminology, frequently seen on Araceae labels, with "Spadix" intended for the spathe, in this case, and "Inflorescence" for the spadix.



*Anthurium limonense* is similarly precarious. It is somewhat disconcerting that this species has been collected just three times, despite intensive collecting programs in Parque Nacional Tortuguero and the adjacent Refugio Nacional de Fauna Silvestre Barra del Colorado and Estación Biológica La Selva.

*ANTHURIUM TRINERVE* Miq., *Linnaea* 17:66. 1843.

This name has been applied to a well-known, widespread species that is very similar to the even better known *Anthurium scandens* (Aubl.) Engl. The important differences between these two taxa are enumerated in various publications, e.g., Croat (1983:233). To summarize, the taxon known as *A. trinerve* is characterized (at least in Central America) by an erect spathe, a purplish spadix, and ovoid, acute fruits, while *A. scandens* has a reflexed spathe, a whitish to greenish spadix, and subglobose, rounded fruits.

The problem regarding *Anthurium trinerve* has both nomenclatural and taxonomic components. According to the precepts of the most recent (Tokyo) *Code* (Greuter, *et al.* 1994), *A. trinerve* Miq. (1843) is an illegitimate name because it is preoccupied by *A. trinervium* Kunth (*Enum. pl.* 3:76. 1841.), effectively a homonym [see Art. 53.3, especially Ex. 8, which includes *trinervis* and *trinervius* (the masculine-gender equivalents of *trinerve* and *trinervium*) among the examples of "epithets so similar that they are likely to be confused"].

What name should Mesoamerican workers use, then, for the taxon with erect spathes, purplish spadices, and acute fruits that has been generally known as *Anthurium trinerve*? My efforts to establish which of the names listed in synonymy under *A. trinerve* in recent revisions (Croat 1983, 1986) might qualify as the next available name at species rank have been fruitless. The oldest suggested synonym is *Anthurium brachyspathum* K. Koch & Bouché (*in* K. Koch, *Allg. Gartenzeitung* 25:233. 1857.); though I have not seen the type (if any exists), the protologue describes the spathe as widely spreading ("patentissima") and the spadix as greenish white, indicating that *A. brachyspathum* should be considered a synonym of *A. scandens* rather than *A. trinerve*. The only other purported synonym at species rank is *Anthurium codajasii* G.M. Barroso (*Arch. Jar. Bot. Rio de Janeiro* 15:97. 1957.) from Estado Amazonas, Brazil; but that was described as having yellow spadices and thus is also of dubious application. Moreover, *A. trinerve* has not otherwise been reported from that part of Brazil.

Conservation of *Anthurium trinerve* Miq. over *A. trinervium* Kunth might be seen as a viable option; however, it is not at all certain, from the original description and photographs of the Surinamese holotype, whether the name *A. trinerve* itself has been properly applied to Central American material. *Anthurium trinerve* remains a poorly defined taxonomic concept that may well prove to harbor several different species (in fact, as shall be seen, it includes two distinct entities in Costa Rica alone). Furthermore, *A. trinervium* Kunth, though by far the lesser known name, is currently in use for a rare Brazilian species (in sect. *Urospadix*) still regarded as distinct, and has no known synonyms. Thus it seems inadvisable, for the purpose at hand, to propose conservation for *A. trinerve* Miq.

Therefore, a new name would seem to be called for. I consider that the name *Anthurium trinerve* var. *obtusum* Engl., based on Ecuadorean material, pertains unequivocally to the species commonly called *A. trinerve* in Costa Rica. Engler (1905) agreed, referring Costa Rican collections to var. *obtusum*, while restricting the autonymic variety to South America. I herewith elevate var. *obtusum* to species rank.

**ANTHURIUM OBTUSUM** (Engl.) Grayum, *stat. et comb. nov.* BASIONYM: *Anthurium trinerve* Miq. var. *obtusum* Engl., Bot. Jahrb. Syst. 25:357. 1898. TYPE: ECUADOR. [Chimborazo:] Pallatanga, 8/91, *Sodiro* 2 (LECTOTYPE: B! [here designated]).

Two Sodiro collections, one from Pallatanga and another from Nanegal, were cited in the protologue, with neither designated as the holotype. Croat (1983, 1986) cited only the Pallatanga syntype as the "Type," but it is questionable whether this action constituted lectotypification, as he had not seen the collection and did not specify a herbarium. I have studied only the Pallatanga collection, which I here explicitly designate as the lectotype.

As mentioned above, the species now to be known as *Anthurium obtusum* comprises two discrete taxonomic entities in Costa Rica. That best corresponding with the type is confined to the Atlantic slope. Collections from the Pacific lowlands, from the Reserva Biológica Carara south to the Península de Burica, differ consistently from Atlantic slope material in having white or greenish (rather than purplish) spadices, in addition to generally narrower leaf-blades. This material agrees with *A. obtusum*, rather than *A. scandens*, in having erect spathes and acute fruits, and is here distinguished as a new subspecies of the former.

**ANTHURIUM OBTUSUM** (Engl.) Grayum subsp. **PUNTARENENSE** Grayum, *subsp. nov.* TYPE: COSTA RICA. San José: Cantón de Turrubares, R. B. Carara, Puesto Carara to junction of Río del Sur and Río Carara, 9° 46' 30" N, 84° 32' 00" W, 180 m, 1 Apr 1993, *M. Grayum* 10398 (HOLOTYPE: MO-4570253!; Isotypes: CR!, INB!).

Subspecies haec ab subspecie nominata differt laminis foliorum plerumque angustioribus spadicebus albis viridi-albisve.

Trunk epiphytes to at least 18 m above the ground; stems ca. 3.5–72 × 0.2–0.5 cm; cataphylls weathering to persistent reticulum of reddish brown fibers. Petioles 0.8–6.0 cm, D-shaped, channeled adaxially, the margins acute. Leaf-blades 6.6–15.9 (–18.1) × 1.0–4.2 (–4.8) cm, simple, narrowly elliptical to lanceolate. ± densely black-glandular abaxially, sparingly or not evidently black-glandular adaxially. Peduncles 1.7–12.0 cm, terete. Spathe ca. 1.0–2.5 × 0.4–0.8 cm, ovate to lanceolate, erect-ascending at anthesis, white or greenish white. Spadix 1.7–3.1 cm, subsessile, white. Ripe frts. white, bluish white ("blanco-celeste"; Zamora, *et al.* 1459), or "white with a purplish cast" (Kernan & Phillips 564).

Pacific lowlands of Costa Rica from the Reserva Biológica Carara south to the Península de Burica; 0–700 m; January–August.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Puntarenas: Reserva Indígena Guaymí, ca. 2 km al Oeste de donde Río Pavón se junta con Río Rincón, Golfito, 8° 37' 00" N, 83° 31' 30" W, 250 m, *Aguilar 270* (CR); Cantón de Golfito, Península de Osa, cabeceras del Río Agujas, Puerto Jiménez, 8° 32' N, 83° 26' W, 300–400 m, *Aguilar 1860* (INB); Cantón de Osa, R. F. Golfo Dulce, Los Mogos, 8° 46' 20" N, 83° 22' 40" W, 200 m. *Aguilar 4125* (INB); along the interamerican Hwy., near the Buenos Aires turnoff [Valle de El General], 9° 9' N, 83° 19' W, ± 400 m, *Burger & Mata U. 4670* (CR); about 4 miles west of Rincón de Osa, Osa Peninsula, 8° 42' N, 83° 31' W, 30 m, *Burger & Stolze 5530* (CR); Cantón de Osa, R. F. Golfo Dulce, Península de Osa, Rancho Quemado, camino a Chiquerón, 8° 43' 00" N, 83° 34' 50" W, 200–350 m, *M. M. Chavarría, et al. 425* (INB); Cantón de Golfito, P. N. Corcovado, Playa Llorona, 8° 31' 55" N, 83° 39' 10" W, 0 m, *Chinchilla 151* (INB); eastern base of Fila Barrigones, ca. 1 km S and 2 km W of Cañasas (ca. 12 km S of Rincón de Osa), 8° 34' N, 83° 25' W, 60 m, *Croat & Grayum 59803* (MO); Cantón de Golfito, P. N. Piedras Blancas, Río Bonito, 8° 41' 25" N, 83° 13' 55" W, 100 m, *Fletes, et al. 252* (INB); Reserva Forestal Golfo Dulce, Osa Peninsula, Rancho Quemado, ca. 15 km W of Rincón, along Río Riyito, 8° 42' N, 83° 33' W, 250–350 m, *Hammel, et al. 16917* (CR); Cantón de Osa, Rincón, cuenca superior de Quebrada Aguabuena, 8° 42' 50" N, 83° 31' 42" W, 350 m, *G. Herrera 3962* (INB); Golfito, Refugio de Vida Silvestre, Quebrada Negra hasta Cerro Nicuesa, 8° 41' 30" N, 83° 12' 50" W, 345 m, *G. Herrera & Rivera 7023* (CR); Golfito, Playa Cacao, cuenca media de Quebrada Nazareno, 8° 37' 40" N, 83° 11' 10" W, 100 m, *G. Herrera & Rivera 7056* (CR); region Golfito, La Gamba, near KM. 37, 8° 41' N, 83° 13' W, 50–200 m, *Huber & Weissenhofer 356* (CR); Parque Nacional Corcovado, Quebrada Danta, 8° 27–30' N, 83° 33–38' W, 10–30 m, *Kernan & Phillips 564* (CR); adjacent to Airfield, Rincón de Osa, 20–300 m, *Liesner 1804* (MO); Río Agua Buena near Airport to ca. 4 km above it, Rincón de Osa, 20–150 m, *Liesner 1997* (MO); Osa Peninsula, Corcovado National Park, hills 0 km to 2 km west of the park headquarters at Sirena, 8° 29' N, 83° 36' W, 0–200 m, *Liesner 2906* (MO); Cantón de Osa, Rancho Quemado, Estón Forestal, 8° 41' 05" N, 83° 33' 50" W, 230 m, *J. Marín 101* (CR); Península de Osa, Cantón Osa, lomas antes de bajar a Rancho Quemado, 8° 40' 50" N, 83° 32' 45" W, 250–300 m, *C.O. Morales, et al. 750* (USJ); Cantón de Osa, P. N. Corcovado, Península de Osa, unión de los Ríos Rincón y El Niño, 9° 33' 40" N, 83° 29' 58" W, 100 m, *J.F. Morales 3653* (INB); Cantón de Golfito, P. N. Corcovado, bosque Esquinas, 8° 46' N, 83° 15' W, 100 m, *Quesada & Segura 709* (INB); Cantón de Garabito, R. B. Carara, Estación Quebrada Bonita, 9° 46' 50" N, 84° 36' 00" W, 100 m, *E. Rojas 45* (CR.INB); Cantón de Osa, R. F. Golfo Dulce, Estación Esquinas, 8° 42' N, 83° 34' W, 200 m, *Segura &*

*Quesada 64* (CR.INB); old Paul Allen property, NW of Piedras Blancas, 8° 49' N, 83° 17' W, 50 ft., *Webster 22065* (CR). San José: Z. P. La Cangreja, Santa Rosa de Puriscal, margenes del Río Negro, 9° 42' 50" N, 84° 23' 30" W, 400 m, *J.F. Morales 1450* (CR); Cerro Nara ["Puntarenas"], 9° 29' N, 84° 01' W, 700 m, *Zamora, et al. 1459* (MO).

*Anthurium obtusum* subsp. *puntarenense* may presently be considered a Costa Rican endemic, although its occurrence on the Península de Burica virtually guarantees that it will ultimately be found in Panamá. I have made a very thorough search for collections from other areas of Central and South America, but without success.

### HOMALOMENA

*Homalomena* sect. *Curmeria* (Linden & André) Engl. comprises the relatively few (ca. 10) New World species of this large (ca. 147 spp.), mainly Indomalaysian genus. Four species of *Homalomena* are presently known from Costa Rica: *H. picturata* (Linden & André) Regel and *H. wendlandii* Schott are distinctive in having pubescent foliage and staminodia among the female flowers, while *H. erythropus* (Schott) Engl. and the species described below comprise glabrous plants lacking staminodia.

**HOMALOMENA HAMMELII** Croat & Grayum, *spec. nov.* TYPE: COSTA RICA. Heredia: Zona Protectora La Selva, 5 hour walk S of La Selva Biological Station, between the Ríos Peje and Guácimo, 10° 21' N, 84° 03' W, 300–400 m, 15 Mar 1985, *G.E. Schatz & N. Fecher 1047* (HOLOTYPE: MO-3382690!; Isotypes: CR!, DUKE, WIS).

Inter species sectionis *Curmeriae* aspectu cum *Homalomena roezlii* (Mast.) Regel optime congruens, sed differt laminis foliorum non variegatis angustioribusque pedunculis spadicebusque longioribus.

Acaulescent or with erect stems to at least 40 cm tall and 2.5 cm wide. Petioles ca. 28–37 cm, glabrous. Leaf-blades 27.5–39.0 × 12.5–18.7 cm, plain green, broadly elliptic to narrowly ovate, broadly cuneate to rounded at base, glabrous, with ca. 22–31 primary lateral veins per side. Peduncle ca. 17.0–33.5 cm. Spadix (8.5–)12.6–12.9 cm.

Endemic to Costa Rica, Atlantic slope of Volcán Barva; 50–400 m; March, July.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Heredia: "Zona Protectora La Selva," along Quebrada Cantarrana, between Río Peje and Río Guácimo, 10° 22' N, 84° 03' W, 300–400 m, *Grayum & Jacobs 3578* (MO); Zona Protectora, northern slopes Volcán Barba, between Río Peje and Río Guácimo, along Quebrada Cantarrana, 190 m, *Grayum & Schatz 3117* (MO).

CULTIVATED. Plant growing in Botany Greenhouse, Duke University [originally collected at Finca La Selva, Prov. Heredia, Costa Rica, 100 m down river from mouth of Q. El Salto], *Hammel 11429* (MO [3 sheets]).

*Homalomena hammelii* differs from Costa Rican material here called *H. erythropus* in having potentially erect, aerial stems, longer petioles, wider, differently shaped, plain green (rather than variegated) leaf-blades with more numerous primary lateral veins, and longer peduncles and spadices. Moreover, *H. hammelii* is known only from the Atlantic slope, while *H. erythropus* is restricted, in Costa Rica, to the Pacific lowlands.

Costa Rican material here referred to as *Homalomena erythropus* (based on a collection from Amazonian Brazil) has previously been identified as *Homalomena roezlii* (Mast.) Regel (see, e.g., Birdsey 1962), a name of dubious application typified by cultivated material introduced from Colombia. However, the protologue of *H. roezlii* (Masters 1874) describes plants with very much larger leaf-blades than *H. erythropus*, more along the lines of *H. hammelii* in this regard. Indeed, the possibility that *H. hammelii* might represent *H. roezlii* was carefully considered; but *H. roezlii* was described as having variegated (rather than plain green) leaf-blades even wider (ca. 20–40 cm) than those of *H. hammelii*, in combination with shorter peduncles (ca. 7.5–10 cm) and spadices (ca. 7.5–8.0 cm). Thus, the name *H. roezlii* is here rejected for any species known from Costa Rica, and must apply instead to some Colombian species remaining to be rediscovered.

*Homalomena hammelii* is effectively restricted to a single canyon on the lower Atlantic slopes of Volcán Barva, as far as is known. There, it may be locally abundant. This species was first discovered by MO botanist Barry E. Hammel (to whom it is dedicated) at the Estación Biológica La Selva, the only other known locality. However, that population was very small and possibly ephemeral, on the banks of a major river.

## MONSTERA

Despite having been revised rather recently (Madison 1977), *Monstera* remains the most difficult genus taxonomically of Central American Araceae. The overall total of 22 species attributed to the genus by Madison (1977) approximately equals the total for Costa Rica alone, according to my field studies. The Costa Rican complement includes at least five new species, as described below.

**MONSTERA BUSEYI** Croat & Grayum, *spec. nov.* TYPE: COSTA RICA. Heredia: between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10° 18.5' N, 84° 04' W, 480–520 m, 8 Apr 1986, *M.H. Grayum 6877* (HOLOTYPE: MO-3486393!; Isotypes: B,CR!).

Inter taxa sectionis *Monsterae* aspectu cum *Monstera adansonii* Schott var. *laniata* (Schott) Madison optime congruens, sed differt venis lateralibus

primariis laminarum foliorum numerosioribus inflorescentiis plerumque solitariis pedunculis plerumque longioribus.

Appressed-climbing trunk epiphytes, fertile ca. 1.5–3.0(–4.0) m above the ground. Juvenile lvs. not shingle-forming. Petioles of adult lvs. 20–60(–76) cm, verrucate-roughened especially toward base, sheathed to geniculum, the sheath erect to involute, often  $\pm$  undulate especially distally, deciduous or  $\pm$  persistent. Leaf-blades 27–60(–83)  $\times$  11–29(–43) cm, ovate to lance-ovate or elliptical, broadly cuneate to rounded, truncate or subcordate at base, imperforate or (less frequently) perforate, marginally entire to pinnately lobed (with up to 4–5 pinnae per side), thinly coriaceous to subcoriaceous, with (12–)15–50+ primary lateral veins per side. Peduncle 12–30 cm. Spathe pale yellowish to white within. Spadix 5.5–13.5(–16.2)  $\times$  1.0–1.6 cm. Infr. cream-yellowish.

Atlantic slope and near Continental Divide in the Cordilleras de Guanacaste, Tilarán, and Central, Costa Rica, and on the Pacific slope from the Río Grande de Tárcoles S to the Península de Burica, where barely entering extreme SW Panamá; 0–1100(–1400+) m; January–July, November.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: Reserva Río San Lorenzo of the University of Costa Rica, headwaters of the Río San Lorenzo below the Fila Volcán Muerto, 10° 23' N, 84° 33' W, 1000 m, *Barringer & Pérez 3830* (CR,F [2 sheets]); Reserva Biológica Monteverde, Río Peñas Blancas, Finca de Tomás Guindon, 10° 19' N, 84° 43' W, 900 m, *Bello 761* (INB,MO); eastern slopes of Volcán Miravalles, west of Bijagua, near the Río Zapote, 10° 44' N, 85° 5' W, ca. 600 m, *Burger, et al. 11663* (MO); Bajos de Jamaical–Reserva de San Ramón, 700–1000 m, *l. Chacón 1809* (CR); Finca Los Ensayos ca. 11 miles NW of Zarcero, ca. 850 m, *Croat 43582* (MO); Cordillera de Tilarán, between San Ramón and Bajo Rodríguez, vicinity of La Balsa, 8.9 mi NW of center of San Ramón, 10° 10' 30" N, 84° 30' W, 1100 m, *Croat 68068* (MO [3 sheets]); canyon of Río Cariblanco and W slope and summit or ridge between Río Cariblanco and Quebrada Quicuyal, SW of Cariblanco, 10° 16' N, 84° 12' W, 840–950 m, *Grayum, et al. 6185* (MO); Monteverde Cloud Forest Res., valley of Río Peñas Blancas, Cordillera de Tilarán, 10° 18' 00" N, 84° 44' 30" W, 850–900 m, *Grayum, et al. 10200* (INB [2 sheets]); Monteverde Reserve, Peñas Blancas river valley, Juan Cruz tract, 10° 18' N, 84° 45' W, 900–1150 m, *Haber ex Bello C. 6158* (MO); Reserva Biológica Monteverde, valle del Río Peñas Blancas, Quebrada Celeste, 10° 20' N, 84° 43' W, 950–1000 m, *Haber & Bello 7050* (MO); Reserva Monteverde, Poco Sol, 13 km S Fortuna, 10° 21' N, 84° 41' W, 700–900 m, *Haber & Zuchowski 9345* (INB); Reserva Forestal de San Ramón, ca. 10 km west of Laguitos, along Río San Lorencito, 10° 18' N, 84° 34' W, 850–1100 m, *Hammel, et al. 15257* (CR,MO [3 sheets]); Parque Rincón de La Vieja, Puesto Santa María, 10° 46' N, 85° 18' W, 900–1000 m, *G. Herrera 1602* (CR,MO); Reserva Forestal de San Ramón, 10° 13' N, 84° 37' W, 800–1500 m, *Nilsson 452* (CR), *456* (CR); P. Nac. Rincón de la Vieja, Quebrada Provisión, 2 Km aguas abajo



del sendero hacia Colonia Blanca, 10° 46' 50" N, 85° 17' 45" W, 820 m, *G. Rivera* 996 (INB); P. Nac. Rincón de La Vieja, Los Zanjos, Quebrada Rancho Grande, falda SE del Volcán Santa María, 10° 46' 42" N, 85° 17' 38" W, 900 m, *G. Rivera* 1126 (INB,MO); P. Nac. Rincón de la Vieja, Colonia Blanca, Quebrada Leiva, 10° 47' 39" N, 85° 16' 36" W, 1000–1300 m, *G. Rivera & Schamm* 1252 (INB). Guanacaste: Parque Nacional Guanacaste, Estación Cacao, 10° 55' 45" N, 85° 28' 15" W, 1100 m, *U. Chavarría, et al.* 25 (CR); *C. Chávez* 315 (INB), *R. Espinoza* 17 (INB), 53 (INB), *Zumbado* 46 (INB); Río Chiquito, Tilarán, Arenal, 10° 24' N, 84° 52' W, 730 m, *Haber & Bello* 8256 (CR); Río Negro ford on south side of Lake Arenal, 10 km NNE of Santa Elena, 10° 25' N, 84° 46' W, 600–800 m, *Haber ex Bello C., et al.* 4866 (MO); Parque Nacional Guanacaste, Estación Pitilla, 11° 5' 2" N, 85° 25' 40" W, 700 m, *C. Moraga* 146 (CR). Heredia: Colonia Virgen del Socorro, 1000 m, *R.A. Chacón, et al.* 68 (CR); Zona Protectora, northern slopes Volcán Barba, between Río Peje and Río Guácimo, along Quebrada Cantarana, 300–400 m, *Grayum & Schatz* 3184 (DUKE). Puntarenas: about 5 km west of Rincón de Osa, Osa Peninsula, 8° 42' N, 83° 31' W, 50–200 m, *Burger & Liesner* 7327 (CR); about 4 miles west of Rincón de Osa, Osa Peninsula, 8° 42' N, 83° 31' W, 30 m, *Burger & Stolze* 5430 (CR [2 sheets]); hills above Palmar Norte, 100–200 m, *Croat* 35125 (F,MO); along road from Panamerican Hwy. at Piedras Blancas to Rincón (on Osa Peninsula), 3.7 mi W of Panamerican Hwy., 8° 46' N, 83° 18' W, 90–105 m, *Croat* 67647 (MO); between Rincón de Osa and Rancho Quemado (valley of Río Chocuaco), ca. 6 km W of main Rincón–Pto. Jiménez Road, 8° 41' N, 83° 31' 30" W, 40 m, *Croat & Grayum* 59744 (CR,MO [2 sheets]); along Quebrada Bonita, Carara Reserve, 9° 47' N, 84° 36' W, 35–80 m, *Grayum, et al.* 5722 (MO); along N Fork (known locally as "Quebrada Mona") of Quebrada Bonita, Carara reserve, 9° 47' N, 84° 36' W, 35–40 m, *Grayum, et al.* 7594 (MO); R. N. Fauna Silv. Golfito, W slope of Fila Gamba, ca. 0.5 km NE of jct. of Quebrada Gamba and Q. Rancho, 8° 41' 00" N, 83° 12' 30" W, 100–200 m, *Grayum, et al.* 10079 (MO); Cantón de Osa, El Campo, entre Aguabuena y Baneguitas, cuenca superior de Quebrada Banegas, 8° 42' N, 83° 32' W, 100–400 m, *G. Herrera* 4823 (INB); Golfito, Refugio de Vida Silvestre, cabeceras de la quebrada Cañaza, 8° 40' 10" N, 83° 11' 20" W, 150 m, *G. Herrera & Rivera* 7005 (CR); Parque Nacional Corcovado, Sirena, Los Patos Forest, 8° 28' N, 83° 35' W, 1–50 m, *Kernan & Phillips* 1118 (CR); adjacent to Airfield, Rincón de Osa, 20–300 m, *Liesner* 1746 (MO); above Airport, Rincón de Osa, 20–300 m, *Liesner* 2052 (MO [2 sheets]). San José: between Bajo La Hondura and Alto La Palma, 83° 59' W, 10° 2' N, 1400–1500 m, *Barringer, et al.* 4003A (CR,F [2 sheets]); SW part of Montañas Jamaica, ca. 2.5 km NE of Bijagual de Turrubares, Carara Reserve, 9° 45' N, 84° 33.5' W, 460–575 m, *Grayum, et al.* 5461 (MO [2 sheets]); western part of Montañas Jamaica, ca. 3 km NE of Bijagual de Turrubares, Carara reserve, 9° 45.5' N, 84° 33'

W, 500–600 m, *Grayum, et al.* 5840 (MO); Tarrazú, Nápoles, estribaciones al Oeste de Cerro Pito, 9° 34' 30" N, 84° 04' 35" W, 1200 m, *G. Herrera, et al.* 8785 (CR).

PANAMA. Chiriquí: Burica Peninsula, San Bartolo Límite, 20 Km west of Puerto Armuelles, 400–600 m, *Busey* 542 (MO).

*Monstera buseyi* is a widespread and frequently collected species within Costa Rica. The only specimen cited above that was seen by Madison (*Busey* 542) is annotated by him as *M. adansonii* Schott var. *laniata* (Schott) Madison. These taxa, both belonging to Madison's sect. *Monstera*, share verrucate-roughened petioles, parallel tertiary leaf-venation, frequently perforate leaf-blades, and smallish spadices shorter than the peduncles. *Monstera buseyi* differs in having usually reddish-brown-drying leaf-blades with more numerous primary lateral veins, and generally longer peduncles. The inflorescences of *M. buseyi* are usually solitary, whereas those of *M. adansonii* tend to be grouped. Furthermore, *M. buseyi* prefers more humid habitats than *M. adansonii*. The two taxa maintain their distinctiveness at sites where they occur, such as the Reserva Biológica Carara.

*Monstera buseyi* might also be compared with *M. costaricensis* (Engl. & K. Krause) Croat & Grayum, which also has verrucate-roughened petioles and may have similarly numerous primary lateral veins. However, *M. costaricensis* (restricted to below 100 m on the Atlantic slope) has relatively shorter petioles with the sheaths coarsely undulate throughout their length, grayish-drying leaf-blades, and relatively shorter peduncles.

This new species, virtually endemic to Costa Rica, is dedicated to Philip Busey, formerly of the Missouri Botanical Garden, who made the first collection known to us (and the only one from Panamá) on 22 Feb 1973.

**MONSTERA DILACERATA** (K. Koch & Sello) K. Koch, in A. Braun, *et al.*, *Append. Gen. Sp. Hort. Berol.* 1855:5. 1855–1856. BASIONYM: *Scindapsus dilaceratus* K. Koch & Sello, in A. Braun, *et al.*, *Append. Sp. Hort. Berol.* 1853:6. 1853–1854.

As discussed in detail by Croat & Grayum (1987), the name *Monstera dilacerata*, though well known, is ambiguously typified and, moreover, was applied in the most recent revision of the genus (Madison 1977) to at least four distinct species. As is the case with many of Koch's aroid species, *M. dilacerata* was based on sterile, cultivated material of unknown origin, and the type specimen itself is lost. The only surviving images of Koch's type are a photograph (MO-1663837!) and drawings at K made by N.E. Brown.

During the course of my recent work on *Monstera* in Costa Rica, I was unable to match the abovementioned photograph with any Costa Rican taxon, despite the fact that Engler & Krause (1908) cited mostly Costa Rican material under this name. I thereby satisfied myself that the name could be disregarded for my purposes as representing a taxon that does not occur in Costa Rica, obviating the sticky issue of the identity of the type. Croat & Grayum (1987) had sidestepped this issue by relegating *M. dilacerata* "to the limbo of nomen dubium status, where it will probably lie forever unless someone can come up with a way . . . to unequivocally interpret the type specimen, in the unlikely event that it ever turns up." Now, new information

suggesting the true identity of Koch's *Monstera dilacerata* has appeared unexpectedly. While studying *Monstera exsiccatae*, I discovered a hand-written note signed by N.E. Brown within a fragment folder affixed to *Donnell Smith 6808* (US), a Costa Rican specimen of the species here called *M. dissecta* (Schott) N.E. Br. ex Donn. Sm. (see following entry). Though Madison annotated this specimen (as *M. dilacerata*), he apparently did not find Brown's note, which is worth reproducing here in its entirety:

6808 *Tornelia dissecta*, Schott. This plant has not been published as a *Monstera*, to which genus it belongs. Engler in DC. Monog. Phan. II. 265 has quoted this plant & *Monstera parkeriana*, Schott, as synonyms of *Monstera dilacerata*, K. Koch, from both of which it is utterly distinct. As for *Monstera dilacerata* K. Koch, I am now fully persuaded that it is identical with *Epipremnum mirabile*, Schott, although I did not think so in 1882 when I published my account of that plant in the *Journal of Botany*. I have seen Koch's type & have drawings of it. N. E. Brown, May 1898.

My cursory perusal of MO's material of *Epipremnum pinnatum* (L.) Engl. (of which *E. mirabile* is now regarded as a synonym) confirmed a general resemblance to the photograph of Koch's *Monstera dilacerata*. I subsequently brought the matter to the attention of Peter Boyce (K), currently undertaking a treatment of *Epipremnum* and allied genera for *Flora Malesiana*. The following response from Boyce was received via e-mail, dated 10 Apr 1996:

Have found Brown's drawings of the type of the name *M. dilacerata*. They absolutely match *E. pinnatum*. For me the most important character is the presence of 'pin holes' (Brown's 'pellucid dots') along the mid-vein. This is a character, as far as I'm aware, unique to *E. pinnatum*. I'd have no hesitation in reducing *M. dilacerata* to *E. pinnatum*.

Brown's reference to "pellucid dots" is contained in the *Journal of Botany* article (Brown 1882) mentioned in his hand-written note. It may be assumed that Brown observed these dots, first-hand, on Koch's type specimen. Thus, the *Monstera dilacerata* problem appears finally to be resolved: the name can be buried safely in synonymy under the much older *Epipremnum pinnatum* (L.) Engl., long in use for a familiar Indomalaysian species that Koch must have had in cultivation.

Although it would be possible to maintain *Monstera dilacerata* with a conserved type, there would seem to be no point in doing so, since the name has never been used consistently for any single species. The four Costa Rican species included by Madison (1977) under *M. dilacerata* will henceforth be known by the names *M. dissecta*, *M. glaucescens* Croat & Grayum, *M. lentii* Croat & Grayum, and *M. pinnatipartita* Schott, all dealt with separately in the present paper.

**MONSTERA DISSECTA** (Schott) N.E. Br. ex Donn. Sm., *Enum. Pl. Guatem.* 5:88. 1899. **BASIONYM:** *Tornelia dissecta* Schott, *Oesterr. Bot. Z.* 8:179. 1858.

Although Croat & Grayum (1987) believed they were transferring *Tornelia dissecta* Schott to *Monstera* for the first time, the combination had already been validated long before, as indicated above. For further information, see the foregoing discussion under *Monstera dilacerata*.

**MONSTERA FILAMENTOSA** Croat & Grayum, *spec. nov.* TYPE: COSTA RICA. Heredia: S base of Cerros Sardinal, Chilamate de Sarapiquí (N side of Río Sarapiquí), 10° 27.5' N, 84° 04' W, 80–110, 4 Jul 1985, *M. Grayum & B. Hammel 5539* (HOLOTYPE: MO-3446661-4!; Isotype: CR!).

Inter species sectionis *Marcgraviopsis* aspectu cum *Monstera punctulata* (Schott) Schott *ex* Engl. optime congruens, sed differt caulibus sulcatis dorsiventraliter compressisque laminis foliorum secus costam per fila laminaria perforatis inflorescentiis parvioribus spathis intus plerumque subroseis.

Appressed-climbing trunk epiphytes, fertile ca. 3.5–5.0 m above the ground, the stems  $\pm$  dorsiventrally compressed and coarsely sulcate. Juvenile lvs. shingle-forming. Petioles of adult lvs. ca. 23–61 cm,  $\pm$  smooth, sheathed to near geniculum, the sheath deciduous. Leaf-blades ca. 48–110  $\times$  26–56 cm, narrowly elliptical to lance-oblong, broadly cuneate to rounded or subcordate at base, perforate medially via  $\pm$  filamentous strands,  $\pm$  regularly (6–)9–15-pinnate or deeply pinnatifid [with 1(–2) primary lateral veins per pinna], thinly coriaceous to subcoriaceous. Peduncle ca. 4.5–11 cm. Spathe whitish to (usually) pinkish within. Spadix 6.1–11.0  $\times$  1.5–2.2 cm. Infr. color unknown.

Costa Rica (Atlantic slope of Cordilleras Central and Talamanca, Pacific slope on the Península de Osa) to extreme NW Colombia; 0–550(–700) m; January, April, July–September.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Heredia: between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10° 18.5' N, 84° 04' W, 480–520 m, *Grayum 6890* (CR [2 sheets], MO [2 sheets]); Zona Protectora, northern slopes Volcán Barba, between Río Peje and Río Guácimo, along Quebrada Cantarana, 300–400 m, *Grayum & Schatz 3172* (DUKE). Limón: north end of Tortuguero National Park and near the Boca de las Lagunas de Tortuguero, 10° 34' N, 83° 32' W, 0–30 m, *Burger & Antonio 11279* (F); Refugio Barra del Colorado, between Río Chirripocito and Río Sardina, 10° 38' N, 83° 45' W, 12 m, *Grayum 9808* (CR, MO); between Río Pacuare and Quebrada Diablo, ca. 2.5 km E of Siquirres, 10° 06' N, 83° 29' W, 100–200 m, *Grayum, et al. 7701* (CR); Cordillera de Talamanca, ridge separating Quebrada Cañabral from Río Barbilla, and slope leading down to the latter, 10° 02' N, 83° 26' W, 200–400 m, *Grayum, et al. 8762* (CR, MO [2 sheets]); Parque Nacional Tortuguero, Lomas de Sierpe, 1 km al Oeste del puesto del Parque el Río Sierpe, 10° 24' N, 83° 33' W, 100 m, *Robles, et al. 2001* (CR, MO); Hamburg Finca, on the Río Reventazón below Cairo, 55 m, *Standley & Valerio 48874* (US); Cerro Coronel, E of Laguna Danto, 10° 41' N, 83° 38' W, 20–170 m, *Stevens 23789* (CR, MO), *24366* (CR, MO). Puntarenas: between Rincón de Osa and Rancho Quemado, ca. 10 km W of main Rincón–Pto. Jiménez Road, 8° 41' N, 83° 32' 30" W, 150–260 m, *Croat & Grayum 59751* (CR, MO [4 sheets]); Cantón de Osa, Aguabuena, margen izquierda de Quebrada El Campo, Rincón, 8° 42' 45" N, 83° 31' 35" W, 200 m, *G. Herrera 4352* (INB, MO).

PANAMA. Bocas del Toro: between Fortuna Dam and Chiriquí Grande, 7.3 mi N of bridge over Fortuna Dam, 3.2 mi N of Continental Divide, 8° 45' N, 82° 15' W, 700 m, *Croat & Grayum 60233* (MO [2 sheets]). Colón: Santa Rita Ridge Road, along trail at end of road to Río Indio, beginning 10.6 km from Transisthmian Highway, 3 km beyond hydrographic station, 380 m, *Croat 34337* (F,MO); Santa Rita Ridge Road, ca. 22 km from Transisthmian Highway, 9° 25' N, 79° 40' W, 500 m, *Hammel, et al. 14499* (MO [4 sheets]). Darién: headwater of Río Tuquesa, ca. 2 km air distance from Continental Divide, in vicinity of upper gold mining camp of Tyler Kittredge, *Croat 27179* (MO). San Blas: along El Llano—Cartí road, 10.5 mi from Interamerican Hwy., 9° 44' N, 78° 68' W, 550 m, *Croat 60488* (MO [5 sheets]); El Llano—Cartí Road, 14 mi N of Panamerican Highway, 9° 15' N, 79° 00' W, 300 m, *Croat 69243* (MO [2 sheets]).

COLOMBIA. Chocó: East side Serranía del Darién, approached from Acandí, near Finca Las Cascadas, 8° 30' N, 77° 20' W, 80–100 m, *Juncosa 590* (MO [3 sheets]).

*Monstera filamentosa* is a member of sect. *Marcgraviopsis* Madison, characterized by appressed juvenile “shingle leaves” and relatively short (compared to the spadix) peduncles. The only two specimens among those cited above seen by Madison, *Standley & Valerio 48874* and *Croat 27179* (both sterile), were identified as *M. punctulata* (Schott) Schott *ex* Engl. However, *M. filamentosa* differs from the latter in its ± flattened, sulcate stems, leaf-blades medially perforate via filamentous laminar strands (whence the species epithet), smaller inflorescences, and usually pale pinkish (vs. cream-yellowish) spathes. Moreover, *M. filamentosa* occurs at generally lower elevations than *M. punctulata*.

**MONSTERA GLAUCESCENS** *Croat & Grayum, spec. nov.* TYPE: COSTA RICA. Heredia: Estación Biológica La Selva, at confluence of Río Sarapiquí and Río Puerto Viejo, Atlantic slope, 10° 26' N, 84° 01' W, 50–75 m, 5 Nov 1988. *M. Grayum 8972* (HOLOTYPE: MO-3670954!).

Inter species sectionis *Monsterae* aspectu cum *Monstera dissecta* (Schott) N.E. Br. *ex* Donn. Sm. et *M. pinnatifida* Schott optime congruens, sed differt parte petioli ultra vaginam longiore petiolis pedunculis spathis in alabastro extus glaucis.

Appressed-climbing trunk epiphytes, fertile ca. 1.0–2.5 m above the ground. Juvenile lvs. not shingle-forming. Petioles of adult lvs. ca. 14.5–41.0 cm, ± smooth, glaucous, sheathed for ca. 50–75% their total length, the sheath erect, persistent. Leaf-blades ca. 24–47 × 10.5–33.0 cm, ovate to elliptical, broadly cuneate to rounded, truncate or subcordate at base, imperforate, ± deeply pinnatifid with (2–)3–5(–8) pinnae per side, subcoriaceous to coriaceous, with 6–17 primary lateral veins per side. Peduncle ca. 10–22 cm, glaucous. Spathe white within, glaucous externally (in bud). Spadix 5–9 × 1.0–1.7 cm. Infr. white to light yellow.

Southeastern Nicaragua and Costa Rica (Atlantic slope) to E Panamá; 0–850 m; January–November.



ADDITIONAL SPECIMENS EXAMINED. NICARAGUA. Río San Juan: near Caño Chontaleno, 20 Km. N.E. of El Castillo, 200 m, *Neill & Vincelli 3489* (MO). Zelaya: Río Punta Gorda, Atlanta, "La Richard" Loma San Jorge, 11° 31' N, 84° 04' W, 150–160 m, *Moreno & Sandino 13047* (MO), *13054* (MO); Caño Costa Riquita, ca. 1.8 km SW of Colonia Naciones Unidas, S of road between Colonia Nueva León and Colonia Naciones Unidas, ca. 11° 43' N, 84° 18' W, 150–180 m, *Stevens 5030* (MO).

COSTA RICA. Alajuela: San Carlos, 3 km south of Boca de Arenal, 10° 30' N, 84° 27' W, 100 m, *Hammel & de Nevers 15320* (MO); 2 km N of Santa Rosa, 15 km N of Boca Arenal on Quesada–Muelle San Carlos–Los Chiles road, 10° 38' N, 84° 31' W, ca. 100 m, *Liesner, et al. 15034* (CR,MO [2 sheets]); Bajo Rodríguez, ca. 300 m, *Utley & Utley 4625* (MO). Heredia: entre el campamento Canta Rana y Río Peje, Magsasay, 400 m, *I.A. Chacón 70* (CR); Finca La Selva, Puerto Viejo de Sarapiquí, *I. Chacón 1132* (CR); Finca La Selva, Puerto Viejo de Sarapiquí, along El Surá trail, 100–150 m, *Croat 44322* (MO [2 sheets]); O.T.S. La Selva Reserve, 10° 26' N, 84° 01' W, *Croat 61217* (MO); north of Puerto Viejo, 10 km down road, then 7–8 km west in forest, *Garwood, et al. 848* (CR,MO); south of Puerto Viejo, 2 km south of Magsasay Penal Colony, c. 200 m, *Garwood, et al. 1111* (CR); Finca La Selva, at confluence of Río Sarapiquí and Río Puerto Viejo, 10° 26' N, 84° 01' W, 50–80 m, *Grayum 7667* (MO); Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, ca. 100 m, *McDowell 222* (MO). Limón: 12 km W of Bri Bri between Suretka & the drilling platforms, ca. 200 m, *Barringer 3043* (CR [2 sheets]); Talamanca cantón, between Cahuita and the oil drilling platforms beyond Suretka, ca. 9° 35' N, 82° 55' W, 100–300 m, *Barringer, et al. 2643* (CR [2 sheets],F); Hacienda Tapezco–Hda. La Suerte, 29 air km W of Tortuguero, 10° 30' N, 83° 47' W, 40 m, *Davidson, et al. 6938* (MO); 7 Km SW of Bribri, 100–250 m, *Gómez, et al. 20372* (MO [5 sheets]); Refugio Barra del Colorado, between Río Chirripocito and Río Sardina, 10° 38' N, 83° 45' W, 12 m, *Grayum 9800* (CR,MO [2 sheets]); between Río Pacuare and Quebrada Diablo, ca. 2.5 km E of Siquirres, 10° 06' N, 83° 29' W, 100–200 m, *Grayum, et al. 7702* (CR,MO); Parque Nacional Tortuguero, Estación Agua Fría, 6–7 Km al sureste, Cerros Azules, 10° 27' N, 83° 34' W, 70 m, *Robles 1553* (CR), *1558* (CR), *1579* (CR); Parque Nacional Tortuguero, Estación Agua Fría, ca. 12 Km al Noreste, pasando el Río Pueblo Nuevo, sobre las Lomas de Sierpe, 10° 26' N, 83° 32' W, 80–100 m, *Robles 1672* (CR); Cantón de Limón, Cerro Muchilla, Fila Matama, 9° 47' 50" N, 83° 05' 30" W, 850 m, *Robles & A. Chacón 2735* (CR); Finca Montecristo, on the Río Reventazón below Cairo, ca. 25 m, *Standley & Valerio 48938* (US), *48945* (US), *49010* (US).

PANAMA. Coclé: north of El Copé, ca. 500 m, *D'Arcy 11294* (MO); vicinity El Copé, 5–6 mi N of El Copé, 8° 38' N, 8° 35' W, 600–800 m, *Croat & Zhu 77200* (CR,MO [2 sheets]). Darién: Río Balsa between Manene & Guayabo, *Duke & Nickerson 14956* (US). Panamá: road past Altos de Pacora, 3.0–3.5 mi NE of Altos



de Pacora, 7.8–8.2 mi above Pan Am Highway, 11.1–11.6 mi beyond Lago Cerro Azul, 9° 15' N, 79° 25' W, 700–750 m, *Croat 68681* (MO [2 sheets]); Cerro Jefe, .5 Km south of the summit, *Busey & Croat 260* (MO).

*Monstera glaucescens*, a member of Madison's sect. *Monstera*, belongs to the species complex formerly subsumed under the name "*Monstera dilacerata*"; all of the above-cited specimens seen by Madison (*Standley & Valerio 48938, 48945, 49010; Duke & Nickerson 14956*) are so determined. Within this group, *M. glaucescens* is most similar to *M. dissecta* and *M. pinnatifidita*, from both of which it differs in its glaucous parts (suggesting the specific epithet) and comparatively short petiole sheaths.

Unfortunately, these critical diagnostic characters may be difficult to assess on herbarium material. The leaf-blades of *Monstera glaucescens* dry blackish, as in *M. pinnatifidita* but unlike the sympatric *M. dissecta*.

*Monstera glaucescens* comprises rather short-stemmed, appressed-climbing, understory trunk epiphytes of primary forests, whereas plants of *M. dissecta* and *M. pinnatifidita* tend to be coarser, higher climbing, and weedier.

**MONSTERA LENTII** Croat & Grayum, *spec. nov.* TYPE: COSTA RICA. Cartago: 10 km S of Cartago by air, along confluence of Río Empalme and Río Estrella, 1 km S of Palo Verde by road, 9° 46' N, 83° 57' W, 1450 m, *Liesner & Judziewicz 14549* (HOLOTYPE: MO-3116693-4!; Isotype: RSA!).

Inter species sectionis *Monsterae* aspectu cum *Monstera pinnatifidita* Schott optime congruens, sed differt stylis conicis teretibusve projectisque stigmatibus capitatis habitatione montana.

Appressed-climbing trunk epiphytes, fertile ca. 2–3(–8) m above the ground. Juvenile lvs. not shingle-forming. Petioles of adult lvs. 21–56 cm, ± smooth, sheathed to within ca. 1–4 cm of geniculum, the sheath erect to revolute, persistent (except Panamá). Leaf-blades 24–60 × 13.5–41.0 cm, ovate to ± oblong, broadly cuneate to rounded or subcordate at base, often perforate, ± deeply pinnatifid (with 3–8 pinnae per side), subcoriaceous, with 10–14 primary lateral veins per side. Peduncle 7.5–25 cm. Spathe white to cream-yellowish within. Spadix 4.3–10 × 1.3–2.0(–3.1) cm. Infrs. white.

Costa Rica and western Panamá; 1050–1650+ m; March–September, November–December.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Cartago: hills above El Muñeco, along Río Sombrero, 9° 45' N, 83° 55' W, 1500 m, *Barringer & Christenson 4144* (MO [2 sheets]); Tapantí Hydroelectric Reserve trail along Río Dos Amigos, 1600–1700 m, *Croat 36192* (MO [2 sheets]); between Moravia and Quebrada Platanillo, 3–5 km from Finca Racine in Moravia, 1200–1300 m, *Croat 36615* (CR, MO); along Camino Raiz de Hule, SE of Platanillo (Tsipirí), 1200–1400 m, *Croat 36723* (MO), *36748* (MO [2 sheets]); Tapantí reserve ca. 1 km S of jct. of Quebrada

Salto and Río Grande de Orosi, 9° 43' N, 83° 47' W, 1500–1800 m, *Croat & Grayum 68291* (MO [3 sheets]); Reserva de Tapantí, 1300–1800 m, *Gómez 18772* (MO); hill just to north of Quebrada Casa Blanca, Tapantí, 9° 47' N, 83° 47.5' W, ca. 1350 m, *Grayum 3889* (MO [2 sheets]); along tributary of Quebrada Casa Blanca, Tapantí, 9° 47' N, 83° 48' W, ca. 1350 m, *Grayum & Sleeper 3696* (MO [2 sheets]); Hacienda Queverí, Río Macho de Paraíso, along road leading to Río Blanco, 9° 45' N, 83° 51' W, ca. 1630 m, *Grayum, et al. 3490* (MO [2 sheets]); Turrialba, Tayutic, Vereh, siguiendo la Fila entre Río Vereh y Río Jicotea, 9° 46' N, 83° 32' 40" W, 1500 m, *G. Herrera & Cascante 8130* (CR); hillside overlooking Río Grande de Orosi, about 3 km S.E. of Tapantí, 1400 m, *Lent 824* (US); Reserva Forestal Río Macho, 1300–1500 m, *Nilsson & Manfredi 125* (CR). Limón: Cantón de Limón, N flank of Fila de Matama in headwaters of Río Boyei, Cordillera de Talamanca, 9° 45' N, 83° 19' W, 1200–1300 m, *Grayum 11025* (INB [2 sheets], MO [2 sheets]); Cantón de Talamanca, Alto Lari, Kivut, entre las cabeceras del Río Lari y Río Dapari, 9° 23' 33" N, 83° 05' 40" W, 1550 m, *G. Herrera 5358* (MO).

PANAMA. Bocas del Toro: between Fortuna Dam and Chiriquí Grande, along gravel road which departs main hwy. near Continental Divide (4.5 mi N of bridge over Fortuna Lake), 8° 44' N, 82° 17' W, 1170 m, *Croat 66659* (MO); Fortuna Dam region, along continental divide trail bordering Chiriquí, 8° 45' 04" N, 82° 15' 04" W, 1200–1300 m, *McPherson & Aranda 10057* (MO [2 sheets]). Chiriquí: N. E. del campamento de Fortuna (Hornito), sitio de presa, 8° 45' N, 82° 15' W, 1000–1200 m, *Correa A., et al. 2465* (MO), *2688* (MO); Cerro Colorado, along road above Félix 29 km above bridge over Río San Félix (7.9 km above turnoff to Escopeta), 1500 m, *Croat 37080* (MO); vicinity of Fortuna Dam site on Río Chiriquí beyond Gualaca, 20.9 mi from bridge over Río Esti, 10.8 mi beyond Los Planes de Hornito, 1400 m, *Croat 48720* (MO); between Gualaca and Fortuna dam site, 10 mi NW of Los Planes de Hornito, 8° 45' N, 82° 17' W, 1260 m, *Croat 50077* (MO [2 sheets]); Gualaca–Chiriquí Grande Road over Fortuna Lake, along gravel road which departs main highway near Continental Divide (4.5 mi N of middle of bridge over Fortuna Lake), 8° 44' N, 81° 17' W, 1170 m, *Croat 66670* (MO); between Fortuna Lake and Chiriquí Grande, 4.5–5.0 km N of dam over Fortuna Lake, 8° 43' N, 82° 17' W, 1100–1135 m, *Croat & Grayum 59988* (MO [2 sheets]); Fortuna Dam Area, Fortuna–Chiriquí Grande, 5.3 mi N of center of Fortuna Dam, then 1.4 mi W along gravel road to Continental Divide Trail, 8° 44' N, 82° 17' W, *Croat & Zhu 76318* (MO [2 sheets]); Fortuna Dam Area, Fortuna–Chiriquí Grande, 1.8 mi NW of center of dam, 8° 45' N, 82° 18' W, 1080 m, *Croat & Zhu 76499* (MO); just west of the Fortuna camp, 1400–1600 m, *Folsom, et al. 5358* (MO); vicinity of Fortuna Dam, in valley south of lake, 8° 45' 04" N, 82° 15' 04" W, 1200–1300 m, *McPherson & Aranda 10124* (MO).

*Monstera lentii*, a member of Madison's sect. *Monstera*, is one of several species formerly included in "*Monstera dilacerata*"; *Lent 824*, the only specimen cited above that was seen by Madison, was so annotated. It is unique in this group (and among all other Costa Rican *Monstera* species) in its conical or terete, projecting styles with

capitate stigmas, and is also the only species in the "*Monstera dilacerata*" complex occurring above 1000 m elevation on the Atlantic slope of the Cordillera de Talamanca. The deeply pinnatifid, blackish-drying leaf-blades of *M. lentii* especially recall *M. pinnatifartita*, restricted to the Pacific lowlands in Costa Rica.

The Panamanian material cited here, mainly from the La Fortuna region, seems to have consistently deciduous petiole sheaths, and is included tentatively.

This new species is dedicated to Roy W. Lent, currently a resident of Costa Rica, who made the first collection known to us on 16 Apr 1967.

**MONSTERA MOLINAE** Grayum, *spec. nov.* TYPE: COSTA RICA. Guanacaste: Parque Nacional Rincón de la Vieja, the SE slopes of Volcán Santa María, above Estación Hacienda Santa María, 10° 47' N, 85° 18' W, 900–1200 m, 27–28 Jan 1983, *G. Davidse, L.D. Gómez, M. Sousa, C.J. Humphries, N. Garwood, R. Hampshire, & M. Gibby 23344* (HOLOTYPE: CR-97202!; Isotype: MO!).

Inter species sectionis *Marcgraviopsis* aspectu cum *Monstera spruceana* (Schott) Engl. optime congruens, sed differt habitibus laxius scandenti petiolis laminis foliorum spadicebus longioribus.

Epiphytic vines on tree-trunks, or ascending to canopy. Juvenile lvs. unknown, presumably shingle-forming. Petioles of adult lvs. ca. 7.5–19 cm, smooth (dry), sheathed to near base of blade, the sheath deciduous. Leaf-blades ca. 10.5–33.0 × 8–27 cm, broadly ovate to elliptical, broadly cuneate to rounded or truncate at base, imperforate, deeply pinnatifid with 2–5 pinnae on at least one side, subcoriaceous, with 4–8 primary lateral veins per side. Peduncle ca. 2.5–6.0 cm. Spathe creamy white within. Spadix 5–10 × 1.5–2.4 cm. Infr. color unknown.

Costa Rica (Atlantic slope and near Continental Divide, Cordilleras de Guanacaste, Tilarán and Central) and central Panamá; 0–1000+ m: January–March, November.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: about 3 km NNE of Bijagua along the new road to Upala, 10° 45' N, 85° 3' W, 450 m, *Burger & Baker 9882* (CR); between Cañas and Upala 4 km NNE of Bijagua on slopes leading into Río Zapote, ca. 400 m, *Croat 36259* (MO [2 sheets]); entre la estación de la Reserva Forestal de San Ramón y el camino a la colonia Palmareña, margen derecha Río San Lorenzito, 10° 12' 53" N, 84° 36' 28" W, *G. Herrera Ch. 499* (MO [3 sheets]); Parque Rincón de la Vieja, Upala, siguiendo el canal hasta Quebrada Provisión y de ahí por el canal secundario hasta la quebrada siguiente, 800–900 m, *G. Herrera 1517* (CR,MO); near Los Angeles, Llanura de San Carlos, 100 m, *Molina R., et al. 17685* (NY); Cantón de Upala, P. N. Guanacaste, Cord. de Guanacaste, Estación San Ramón, Dos Ríos, 10° 52' 50" N, 85° 24' 05" W, 550 m, *F. Quesada 191* (INB). Guanacaste: Rincón de la Vieja National Park, path from Puesto Santa María to hot springs, c. 800 m, *Garwood, et al. 755* (CR,MO); El Dos de Tilarán, 4 km N, Cerro La Chirripa, Atlantic slope, 10° 25' N, 84° 50' W, 1000 m,

*Haber ex Bello C. & Lierheimer 4446* (CR,MO). Heredia: entre el campamento Canta Rana y Río Peje, Magsasay, 400 m, I.A. *Chacón 82* (CR,MO); near Porto Viejo along road to Río Sucio, 20 m, *Croat 35689* (MO); Finca La Selva, Sarapiquí, *Grayum 3063* (DUKE). San José: Fila Carrillo, Parque Nacional Braulio Carrillo, 700 m, *Gómez, et al. 21131* (CR [2 sheets]).

PANAMA. Coclé: area surrounding Rivera Sawmill, 7 km north of El Copé, Forgotten Hill, 650–850 m, *Folsom 6207* (MO).

Although juvenile foliage of *Monstera molinae* is unknown, this species is undoubtedly a member of sect. *Marcgraviopsis*, on the basis of its short peduncles (relative to the spadix) and close resemblance to several other species in this group, particularly *M. luteynii* Madison, *M. pittieri* Engl., and *M. spruceana* (Schott) Engl. The first two differ from *M. molinae* in having consistently entire leaf-blades (though some Panamanian populations of *M. pittieri* may have perforate blades); plants of *M. spruceana* have a somewhat different (consistently appressed-climbing) growth habit, are larger in all their parts, and (in Costa Rica) virtually always have entire leaf-blades.

*Molina R., et al. 17685*, the only specimen cited above that was seen by Madison, was annotated by him as "*Monstera dubia* (H.B.& K.) Engler & Krause?"

This new species honors Antonio Molina R. (EAP), dean of Honduran botanists, who made the first collection known to me on 21 Feb 1966.

**MONSTERA PINNATIPARTITA** Schott, Oesterr. Bot. Wochenbl. 7:197. 1857.

TYPE: VENEZUELA. Distrito Federal: Caracas, "*Reichenb. f. comm.*" (HOLOTYPE: W?, presumably lost). Zulia: Distrito Perijá, ca. 13 airline km NE of the intersection of the Maracaibo–La Fría Hwy. (Hwy. 6) and the Río Aricuaisá (near the intersection of LAGOVEN picas 80-2 and 19), 9° 26' N, 72° 29' W, 40 m, 20 Jun 1980, *G. Davidse, A.C. González, & R.A. León 18286* (NEOTYPE: MO-2901380!, here designated; Isoneotype: VEN, *non vidi*).

*Monstera pinnatipartita* is an obscure name, based on a description of a sterile specimen from near Caracas. No type specimen has been found at W (repository for both Schott's and Reichenbach's material), and no illustration appears in Schott's *Icones* (Schott 1983), or anywhere else. The name was not treated at all by Engler & Krause (1908), Bunting (1979), or Croat & Lambert (1986). However, Madison (1977) included *M. pinnatipartita* in synonymy of his *M. dilacerata*, and a careful reading of the description confirms this disposition.

One of the four species of the "*Monstera dilacerata*" complex occurring in Costa Rica is characterized by involute petiole sheaths and blackish-drying leaf-blades deeply pinnatifid into usually narrow segments. For several years, we have used the unpublished name "*Monstera involuta*" for this species. "*Monstera involuta*" is restricted, in Costa Rica, to the Pacific lowlands, from the Golfo Dulce region (including Isla del Caño) north to the Nicoya Peninsula (where it occurs locally in more humid sites). According to a herbarium search at MO, the same species ranges southward to coastal Ecuador, and eastward to northern Colombia and Venezuela, always in hot, lowland regions. In Venezuela, the region of the type locality of *M. pinnatipartita*, "*M. involuta*" is the only species in the "*M. dilacerata*" complex; thus, 1

have no compunction in applying Schott's forgotten name to this species, and would rather resurrect (and clarify) an existing name than publish a new one. With *Monstera dilacerata* removed to the synonymy of *Epipremnum pinnatum*, *M. pinnatipartita* becomes the oldest name in the "*M. dilacerata* complex, and therefore must be used for some species in this group regardless of taxonomy.

The specimen of "*Monstera involuta*" from nearest Caracas that I have seen is *Steyermark & Carreño E. 106897* (MO), from Estado Miranda. However, as this specimen is sterile, I instead select a good, fertile specimen from Estado Zulia to neotypify *M. pinnatipartita*. This specimen, *Davidse, et al. 18286* (MO), is represented by a total of eight duplicates, according to the field-notes of the principal collector. One of these was left at VEN, however I cannot account for the whereabouts of the other six duplicates, which were distributed under the name *Monstera dilacerata*.

### SPATHIPHYLLUM

**SPATHIPHYLLUM MONTANUM** (R.A. Baker) Grayum, *stat. et comb. nov.*

BASIONYM: *Spathiphyllum wendlandii* Schott subsp. *montanum* R.A. Baker, in R.A. Baker & W.C. Burger, *Phytologia* 33:450. 1976.

Baker (*in* Baker & Burger 1976) allied this taxon with *Spathiphyllum wendlandii* largely on the basis of floral details. Baker & Burger apparently did not understand *S. wendlandii* well enough, as they neglected to mention the most distinctive feature of that taxon: the petiole sheath is horizontally splayed and extends virtually to the geniculum. Baker's subsp. *montanum* has typical petiole sheaths, more like those of *S. phrynifolium* Schott. But even though Baker and Burger missed the important petiole character, subsp. *montanum* still comes out next to *S. phrynifolium* (rather than *S. wendlandii*) in their key.

In truth, the relationships among these various *Spathiphyllum* taxa are not well understood, and the treatment of this taxon as a subspecies of *S. wendlandii* implies more knowledge than actually exists. An equally good case could be made for regarding it as a subspecies of *S. phrynifolium*. Baker's "subsp. *montanum*" is a distinctive taxon, both morphologically and ecologically (it is the only montane species in Central America), and is more conveniently treated at species rank.

### STENOSPERMATION

**STENOSPERMATION MAJUS** Grayum, *spec. nov.* TYPE: COSTA RICA. Alajuela: Reserva Forestal de San Ramón, ca. 10 km west of Laguitos, in forest on ridge and secondary woods along Río San Lorencito, 10° 18' N, 84° 34' W, 850–1100 m, 30 May–1 Jun 1986, B. Hammel, G. de Nevers, & C. Gómez 15285 (HOLOTYPE: MO-3474411!).



Species insignis statura sui grandi laminis foliorum ellipticis in sicco rubescentibus spadicebus crassis floribus basalibus secus stipitem decurrentibus a speciebus mihi notis bene distincta.

Epiphytes on stumps, trunks, or occasionally in canopy (or on downfalls). Petioles 11.5–22.5(–43.5) cm, sheathed ca. 65–100% their total length. Lvs. ca. 12.5–48.0 × 5.3–17 cm, elliptical. Peduncles ca. 23–46 cm. Spathe pale green. Spadix ca. 10.7–22.5 × 1.0–1.9 cm, cream-colored, stipitate by ca. 0.5–2.2 cm. Color of ripe frts. unknown.

Atlantic slope of Cordilleras de Tilarán, Central, and Talamanca, Costa Rica; ca. 500–1200 m; February–April, June–July, November.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: Reserva Monteverde, Río Peñas Blancas, 10° 18' N, 84° 44' W, 900 m, *Bello 165* (CR); Reserva Monteverde, Río Peñas Blancas, 10° 19' N, 84° 43' W, 1000 m, *Bello 522* (CR); San Carlos, Peñas Blancas, 900 m, *Haber & Bello C. 1920* (MO); Reserva Biológica Monteverde, valle del Río Peñas Blancas, Quebrada Celeste, 10° 20' N, 84° 43' W, 950–1000 m, *Haber & Bello 7067* (MO); Bosque Eterno de Los Niños, Atlantic slope, Río Peñas Blancas valley, Laguna Poco Sol, 10° 21' N, 84° 40' W, 840 m, *Haber & Zuchowski 11153* (INB,MO). Heredia: along new road to the north of Quebrada Tigre, from Finca El Plástico to ca. 1.5 km NE thereof (ca. 8 km SW of Las Horquetas), 10° 18' N, 84° 02' W, 450–550 m, *Grayum & Sleeper 6531* (CR, MO). Limón: Reserva Indígena Talamanca, entre el Río Sukut y el Río Urén, camino a Purisqui, 9° 24' 30" N, 82° 58' 10" W, 700 m, *A. Chacón 108* (CR); Parque Internac. La Amistad, Croriña, camino a Amubri, Quebrada Crori y Quebrada Lumbeta, 9° 25' 15" N, 82° 59' W, 800 m, *A. Chacón 169* (CR); cerro entre Cerro Chimú y Cerro Matama, 1200 m, *Gómez, et al. 23573* (MO).

As implied by its specific epithet, *Stenospermatum majus* is the largest of all Costa Rican *Stenospermatum* species. It is further distinguished its elliptical, reddish-brown-drying, leaf-blades and long, thick (> 1 cm) spadices with some basal flowers decurrent onto the stipe. Because of their large size, plants of this species have sometimes been misdetermined as *S. robustum* Engl.; however, despite its name, the last-mentioned species (based on a Costa Rica type) comprises smaller plants in every respect, with blackish-drying foliage and non-decurrent basal flowers. The new species more closely resembles the Panamanian "*Stenospermatum luteynii*" (Pérez de Gómez 1983); though I have not seen the proposed type of that still-unpublished name, none of the other specimens at MO so determined by Pérez de Gómez matches *S. majus* in all critical details, differing in one or more of the following characters: extent of petiolar sheathing, leaf-blade shape, thickness of the spadix, or decurrence of basal flowers on the stipe. Similarly large-leaved South American species (*Stenospermatum crassifolium* Engl., *S. maximum* Engl., *S. longifolium* Engl., *S. porteri* Sodiro) have been eliminated by these and other (color of foliage on drying) criteria.



**STENOSPERMATION PTEROPUS** Grayum, *spec. nov.* TYPE: COSTA RICA. Limón: Alto Urén, subiendo por la fila entre la margen derecha de la Quebrada Chaho y la margen izquierda del Río Lorni, Cerro Láubeta, 9° 23' 10" N, 83° 00' 25" W, 1190 m, 26 Jul 1989, G. Herrera 3353 (HOLOTYPE: MO-3853475!; Isotypes: CR!,K,USJ!).

Species insignis foliis suis parvis vagina petiolari horizontaliter explanata usque ad basim laminae extensa a speciebus mihi notis bene distincta.

Epiphyte. Petioles ca. 1.6–3.5 cm, sheathed to leaf-base. Leaf-blades 5.5–9.3 × 1.2–2.0 cm, lanceolate to oblong-lanceolate or narrowly elliptical. Peduncles ca. 4 cm. Color of spathe unknown. Spadix ca. 1.8–2.0 × 0.4 cm, of unknown color, stipitate by ca. 0.3–0.4 cm. Color of ripe frts. unknown.

Atlantic slope of Cordillera de Talamanca, Costa Rica; ca. 1200 m; July.

*Stenospermation pteropus*, known only from the type collection, is the smallest Costa Rican *Stenospermation* (and certainly one of the smallest in the genus). Among Costa Rican species, it is most similar to *S. angustifolium* Hemsl., from which it differs in its horizontally splayed petiole sheaths (whence the species name) and longer inflorescence stipe. In the partial revision of Pérez de Gómez (1983), this species will key to *S. andreanum* Engl. of Panamá and Andean South America, and was originally so identified. However, the last-mentioned species has less extensively sheathed petioles, larger, grayish (rather than reddish-brown) -drying leaf-blades, and stouter spadices than *S. pteropus*.

### SYNGONIUM

**SYNGONIUM CASTROI** Grayum, *spec. nov.* TYPE: COSTA RICA. Puntarenas: P. N. Corcovado, Cerro Brujo, 8° 38' N, 83° 35' W, 600 m, 23 Jan 1991, E. Castro 242 (HOLOTYPE: USJ-49640!).

Species aspectu cum *Syngonio llanoensi* Croat optime congruens, sed differt vagina petiolari usque ad basim laminae plerumque non extensa inflorescentiis multo parvioribus.

[Appressed-climbing] epiphytes. Petioles ca. [9–]20–21 cm, sheathed for ca. 75 [–100]% their total length, the cross-sectional shape not described. Leaf-blades simple, 17.6–32.9 × [4.9–]5.0–7.4[–8.6] cm, lanceolate to lance-elliptic [or oblanceolate], cuneate [or rounded] to the minutely auriculate base (auricles to ca. 4.5 × 3.5 mm, directed ± backward), brittle ("quebradizas"), with ca. [2–]8–9 primary lateral veins per side. Infls. 3 per axil. Peduncles to at least 6.3 cm. Spathe "blanca." Spadix ca. 3.8 × 0.9 cm, "amarillo." Ripe syncarps unknown.

Osa Peninsula [and head of Golfo Dulce], Costa Rica; [150–]600 m; January.

ADDITIONAL SPECIMEN EXAMINED. COSTA RICA. Puntarenas: between Chacarita and Rincón de Osa, ca. 6 km W of Interamerican Highway at Chacarita, 8° 45' N, 83° 18' W, ca. 160 m, *Croat & Grayum 59733* (MO [2 sheets]).

*Syngonium castroi* is distinctive in its simple, narrow leaf-blades minutely auriculate at the base, and small, apically subtruncate spadices. Because of its simple, scarcely lobed leaf-blades, this species would fall into the probably artificial sect. *Oblongatum* Croat (1981). The species with the most similar leaf-blades is the Panamanian *S. llanoense* Croat (1981), which differs in having the petiole sheaths virtually always extending to the leaf base, and much larger (more than twice as long) inflorescences. The new species bears some resemblances to the sympatric *S. laterinervium* Croat (1981), but the latter also has larger inflorescences (in addition to consistently trifoliolate leaf-blades).

*Syngonium castroi* is definitely known only from the type specimen. The above-cited paratype, a sterile collection, is tentatively referred here solely on the basis of leaf shape. It differs from the holotype in certain details (all square-bracketed material in the description and distribution statement pertains only to the paratype).

This new species is dedicated to Emilio Castro, formerly associated with USJ, who collected the first (and, to date, only) fertile specimen.

**SYNGONIUM RAYI** Croat & Grayum, *spec. nov.* TYPE: CULTIVATED. Grown at Selby Gardens [originally collected at La Selva Biological Station, Prov. Heredia, Costa Rica, in early October, 1985 (*J.T. Atwood s.n.*)], 30 May 1990, *H. Luther s.n.* (HOLOTYPE: INB!; Isotypes: MO, PMA, SEL).

Species aspectu cum *Syngonio oduberi* T. Ray optime congruens, sed differt petiolis lobis laminaribus posticis relative longioribus.

Scandent epiphytes, fertile ca. 2–3 m above the ground. Petioles ca. (3.6–)8.4–22.5 cm, sheathed for ca. 58–94+% their total length, the cross-sectional shape not described. Leaf-blades simple, ca. (5.6–)10–24 × (2.5–)3.5–13 cm, ovate, oblong-ovate or oblong-deltate to elliptical, lance-oblong, or lanceolate, cordate to sagittate or hastate at base, dark green to purplish and matte to velvety adaxially, with ca. (3–)4–11 primary lateral veins per side. Infls. 1–4 per axil. Peduncles ca. 2.2–5.2 cm. Spathe tube green externally, dark wine-red within; lamina cream-white. Spadix ca. (6.0–)8.1–9.4 × 0.4–0.7 cm, the male portion white. Ripe syncarps unknown.

Costa Rica (Fila Costeña, Cordillera de Guanacaste, Atlantic slope Cordilleras de Tilarán and Central, Barra del Colorado region) to eastern Panamá (Cerro Jefe, San Blas); 0–1000(–1500) m; May–July, December.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Alajuela: Cerro las Nubes, Macizo Miravalles, 1500 m, *I.A. Chacón 85* (CR); Reserva Forestal de San Ramón, ca. 10 km west of Laguitos, along Río San Lorencito, 10° 18' N, 84° 34' W, 850–1100 m, *Hammel, et al. 15263* (MO). Guanacaste: Parque Nacional Rincón de

la Vieja, the SE slopes of Volcán Santa María, above Estación Hacienda Santa María, 10° 47' N, 85° 18' W, 900–1200 m, *Davidse, et al. 23405* (MO). Heredia: near the Río Puerto Viejo, about 2 km upstream from the confluence with Río Sarapiquí, formerly "Finca La Selva" of L.R. Holdridge, 10° 26' N, 84° 0' W, 100 m, *Burger & Stolze 5859* (CR); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, [ca. 100 m], *Grayum 2281* (DUKE), 2435 (DUKE), 2895 (DUKE), 2959 (DUKE), *Hammel 12462* (DUKE), *Hammel & Trainer 10779* (DUKE); La Selva Reserve, *Lee s.n. 4/8/1984* (MO-3304465); Finca El Bejuco, S base of Cerros Sardinal, Chilamate de Sarapiquí, 10° 27' N, 84° 04' W, 70–100 m, *Ray 114* (MO), 139 (MO). Limón: Refugio Nacional de Fauna Silvestre Barra del Colorado, between Río Chirripocito and R. Sardina, 10° 38' N, 83° 45' W, ca. 10–15 m, *Grayum 9747* (CR,MO); Cantón de Pococí, Parque Nacional Tortuguero, northern terminus of Lomas de Sierpe, S from Río Tortuguero, 10° 29' N, 83° 31' 30" W, 8–25 m, *Grayum, et al. 11164* (INB,MO). San José: Cantón de Tarrazú, Cerro Nara y alrededores, 9° 29' 20" N, 84° 00' 40" W, 1000 m, *M.M. Chavarría & Solís 916* (INB); Tarrazú, Nápoles, ladera Oeste de Cerro Pito, 9° 04' 50" N, 84° 04' 10" W, 1500 m, *G. Herrera, et al. 8805* (CR); Cantón de Dota, Z. P. Cerro Nara, falda SW del Cerro Chingo, 9° 29' 05" N, 84° 01' 02" W, 400–500 m, *J.F. Morales & González 4564* (INB [3 sheets]).

PANAMA. Panamá: Cerro Jefe, NE of Panama City, c. 9° 15' N, 79° 30' W, 850–900 m, *McPherson 9740* (MO). San Blas: Cerro Obu [9° 22' N, 78° 47' W], 400–500 m, *de Nevers, et al. 8040* (MO).

CULTIVATED. Growing in Selby Display House [no locality data], *Atwood & Ugucioni s.n.*, 15 May 1991 (MO-3865329).

*Syngonium rayi* is characterized by its smallish size, clear (rather than milky) sap in all vegetative organs, and simple, usually sagittate to subhastate leaf-blades, dark green and velvety adaxially, with finely crispate-undulate margins. Most of these features are shared with the allopatric *S. oduberi* T. Ray (endemic to the Golfo Dulce region of Pacific Costa Rica), from which *S. rayi* differs in its longer (relative to the leaf-blades) petioles and posterior laminar lobes. Although *S. oduberi* was assigned by Croat (1981) to his sect. *Oblongatum*, *S. rayi* will key to sect. *Cordatum* Croat, because of its more prominent posterior leaf-blade lobes.

Although I dislike selecting a specimen from cultivation as type, *Syngonium rayi* is a distinctive species, and nearly all of the wild collections are unicates. Mature individuals of this species are rare in the wild; it has been collected in flower only about a dozen times. At the La Selva Biological Station, where *S. rayi* is best known, fruiting specimens have never been observed (presumably due to the great scarcity of flowering individuals). Nonetheless, juvenile plants believed to represent this species (e.g., *Lee s.n. 4/18/1984*) are abundant along forest trails, suggesting that vegetative multiplication may be involved.

This species, as presently circumscribed, is rather a variable one, especially as regards leaf-blade size and shape. However, the variation appears continuous, and no

locality outside the Sarapiquí region (Prov. Heredia, Costa Rica) has yielded more than a single collection.

We take pleasure in dedicating this species to Thomas S. Ray (DELS), who recognized it as new during the course of his doctoral research at the La Selva Biological Station in the 1970's. In addition to having contributed significantly to our understanding of *Syngonium* and Araceae in general, Tom is well respected for his conservation work in the Sarapiquí region.

### XANTHOSOMA

*XANTHOSOMA DEALBATUM* Grayum, *spec. nov.* TYPE. COSTA RICA. Puntarenas: along road at base of hills behind Playa Espadilla, SE of Punta Quepos, 9° 23' N, 84° 09' W, ca. 10 m, 24 Sep 1984. *M. Grayum & P. Sleeper* 3927 (HOLOTYPE: CR-110826!, CR-110827!).

Species aspectu cum *Xanthosoma violaceo* Schott optime congruens; sed differt laminis foliorum abaxiale valdius dealbatis petiolis pedunculis spathis extus non glaucis spadicebus parvioribus.

Stem subterranean, a subglobose corm ca. 3 cm diam. Petioles ca. 46–89 cm, sheathed ca. 30–43% their total length., terete beyond sheath. Leaf-blades simple, ca. 31–57 × 17.5–32.0 cm, lance-deltate to ± pandurate, sagittate at base, strongly bicolored (matte and whitened abaxially), with ca. 5–10 adaxially ± sunken primary lateral veins per side; posterior rib naked for 0–0.8 cm. Infls. to at least 4 per axil. Peduncles ca. 18–37 cm. Spathe tube uniformly green externally and within; lamina white to cream-colored. Spadix ca. 10.7–10.5 × 0.5–0.7 cm, the fertile male portion white; fertile female portion (stigmas) pale yellow. Ripe frts. yellow-orange to orange (with axis of female portion of spadix somewhat paler).

Pacific slope of Costa Rica south from the Río Grande de Tárcoles; 0–200(–600+) m; June–July, September–October.

ADDITIONAL SPECIMENS EXAMINED. COSTA RICA. Puntarenas: Reserva Forestal Golfo Dulce, Osa Peninsula, Rancho Quemado, ca. 15 km W of Rincón, in bottom of S end of valley along Río Riyito, 8° 40' N, 83° 34' W, 200 m. *Hammel, et al.* 16977 (CR); along Quebrada Banegas, ca. 4 km W of Rincón de Osa, 8° 41' N, 83° 32' W, ca. 40 m. *Grayum* 4112 (MO. non vidi); Reserva Biológica Carara, along S side of Río Grande de Tárcoles from Carretera Costanera E to vicinity of Paso Rieles (N base of Lomas Pizote), 9° 48' N, 84° 36' W, 20 m, *Grayum & Warner* 8369 (MO); near Rincón, where new road from Piedras Blancas crosses small creek, 8° 43' N, 83° 29' W, ca. 160 m, *Grayum, et al.* 3426 (CR); Rincón de Osa, along ridge between Quebrada Aparicio and Q. Aguabuena, 8° 42' N, 83° 31' W, 200–400 m, *Grayum, et al.* 4016 (CR); valley of Laguna Chocuaco, ca. 9 km W of

Rincón de Osa, 8° 41–43' N, 83° 34' W, ca. 200 m, *Grayum, et al. 4072* (CR), 4080 (CR [2 sheets]); Conte [Península de Burica], *C.E. Valerio CEV-90* (USJ).

*Xanthosoma dealbatum* is distinguished by its cormose habit, sagittate leaf-blades strongly whitened abaxially (whence the name), orange fruits, and Pacific lowland habitat. It is most similar to the cultivated (and naturalizing) *X. violaceum* Schott, from which it differs in its more markedly bicolored leaves, otherwise non-glaucous foliage, and smaller spadices. The leaf-blades of *X. violaceum*, though glaucous abaxially, are not whitened in marked contrast to the adaxial surface; furthermore, *X. violaceum* tends to have glaucous petioles, peduncles, etc.

All collections of *Xanthosoma dealbatum* seen to date are from Puntarenas Prov., Costa Rica. Plants of this species are seasonal, at least in the northern portion of their range, with only the corms surviving the drier periods of the year. This is typical of other cormose *Xanthosoma* species of the Costa Rican Pacific slope, i.e., *X. mexicanum* Liebm. and *X. wendlandii* (Schott) Schott.

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